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promote elongation of the heads, while the third (*C*) acts as an inhibitor which checks the longitudinal development of the heads. When all of these factors are absent, a moderately dense head results, as exemplified by the "squarehead" varieties. When *C* is present and both *L*₁ and *L*₂ are absent, the extremely dense "compactum" form is produced. Although considerable transgressive fluctuation renders the analysis doubtful in individual cases, the total result is sufficiently decisive to leave little doubt of the essential correctness of the interpretations. The discovery that several genes may affect quantitatively the same external characteristic has given an explanation of some hybrid progenies which have seemed to breed true to characters intermediate between the parents, and it also explains the intensification of parental characters in *F*₂ individuals which have often been observed. As an example of the latter phenomenon, a cross between two wheats of intermediate density, having the formulae *CL*₁*L*₂ and *cl*₁*l*₂, produces some *F*₂ plants with very dense heads (*Cl**l*₂), and some with very lax ones (*cL*₁*L*₂). In respect to rust-resistance, the difficulties of analysis are still greater and the author makes no attempt to identify particular genes, but the results of a large number of tests in second and third generations show very clearly two important facts, namely, that there is a segregation of different grades of resistance in the *F*₂, and that the matter is not generally as simple as BIFFEN found it to be in his crosses dealing with this problem. In none of NILSSON-EHLE's crosses was there an indication of a simple monohybrid ratio (3:1) for rust-resistance, as was found by BIFFEN.

KAJANUS¹⁵ reports an instance in which the *spelta*-character (zigzag rachis and adherent glumes) is recessive to the *vulgare*-character (straight rachis and free glumes), a situation exactly the reverse of that found by von TSCHERMAK. This indicates that there are two genotypes of one or the other of these two phenotypes, thus paralleling the now frequently demonstrated existence of dominant and recessive whites. KAJANUS found presence of awns recessive to their absence, and hairiness of the glumes dominant to its absence, as in all other reported crosses in which these characters have been involved.—GEO. H. SHULL.

Cytology and sexuality of *Olpidiopsis*.—Overcoming considerable difficulties in the matter of obtaining and managing material, BARRETT¹⁶ has greatly increased our knowledge of the cytology and especially of the sexuality of the submerse chytrids. Three species of *Olpidiopsis*, parasitic on *Saprolegnia* and *Aphanomyces*, were studied, two of which (*O. vexans* and *O. luxurians*) are described as new. The first part of the paper consists of biological observations, among which will be found many valuable suggestions to anyone undertaking similar work. The zoospores are shown to have two equal flagella

¹⁵ KAJANUS, B., Zur Genetik des Weizens. Botaniska Notiser 1911:293-296.

¹⁶ BARRETT, J. T., Development and sexuality of some species of *Olpidiopsis* (Cornu) Fischer. Ann. Botany 26:209-238. pls. 23-26. 1912.

springing from the same point, although one is directed backward and sidewise in such a manner as to give the appearance of the short lateral cilium that has hitherto figured in the descriptions of this and some other genera of biflagellate Archimycetes. They are distinctly diplanetic and show a pulsating vacuole during the interval between the two periods of activity. Soon after infection the young parasites are lost to view in the host protoplasm, but retain their individuality and develop into zoosporangia without fusing to form plasmodia.

The parasite becomes coenocytic by nuclear division on the beginning of growth. The nuclei, which show the complete concentration of the chromatin into the karyosome characteristic of most chytridiaceous nuclei, appear to divide exclusively by mitosis of a type not very dissimilar from that of *Synchytrium*, but no astral bodies were seen. The chromosomes are approximately six in number. Segmentation is believed to be simultaneous, and begins at least before the sporangium enters the period of rest which it often undergoes before sporulation. The formation of resting spores was found to be dependent on conditions in the culture which are described. The small adjacent cells are definitely shown to be antheridia and the transfer of their coenocytic protoplasm to that of the egg is figured. The number of nuclei of the gametes unfortunately is not stated, but one would judge from the figures that it approximates 100. The fate of the male pronuclei after entering the egg could not be definitely followed, but it is believed that they fuse in pairs with the female pronuclei. The author concludes that "these forms seem to be primitive sexual organisms of the oomycete type. The influence of external conditions on the development of the sexual stage, the mode of fertilization, the unequal size of the two gametes, and the apparent morphological equivalence of these gametes with the sporangia, seem to the writer to point to that assumption."—ROBERT F. GRIGGS.

An epiphytic *Tillandsia*.—The "ball moss," *Tillandsia recurvata*, is found growing epiphytically upon many tree species in the vicinity of Austin, Texas, in such abundance as to be detrimental to its host. BIRGE¹⁷ has found that any damage resulting to the supporting tree must be due to interference with the light supply, as the short holdfast roots merely furnish mechanical support for the moss, the water and salts necessary for the life of the plant being absorbed exclusively by the scale-covered leaves. A sufficient amount may be obtained from three hours dew or rain to last the plant for 38 hours. The leaves are well supplied with chlorophyll in minute oblong plastids, and the complete independence of the plant is shown not only by the entire absence of any organic connection with the living tissues of the host, but also by the fact that it thrives upon old board fences and even upon electric wire insulators. It seems to thrive best in semi-arid conditions. Shade trees may be freed from the epiphyte by scraping off the larger plants before the dissemination of

¹⁷ BIRGE, WILLIE I., The anatomy and some biological aspects of the "ball moss," *Tillandsia recurvata* L. Univ. Texas Bull. 194. pp. 24. pls. 10. 1911.